

National Spatial Data Infrastructure

# Utilities Data Content Standard - Public Review Draft

Facilities Working Group  
Federal Geographic Data Committee

August 1997

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Federal Geographic Data Committee

Department of Agriculture • Department of Commerce • Department of Defense • Department of Energy  
Department of Housing and Urban Development • Department of the Interior • Department of State  
Department of Transportation • Environmental Protection Agency  
Federal Emergency Management Agency • Library of Congress  
National Aeronautics and Space Administration • National Archives and Records Administration  
Tennessee Valley Authority

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## Federal Geographic Data Committee

Established by Office of Management and Budget Circular A-16, the Federal Geographic Data Committee (FGDC) promotes the coordinated development, use, sharing, and dissemination of geographic data.

The FGDC is composed of representatives from the Departments of Agriculture, Commerce, Defense, Energy, Housing and Urban Development, the Interior, State, and Transportation; the Environmental Protection Agency; the Federal Emergency Management Agency; the Library of Congress; the National Aeronautics and Space Administration; the National Archives and Records Administration; and the Tennessee Valley Authority. Additional Federal agencies participate on FGDC subcommittees and working groups. The Department of the Interior chairs the committee.

FGDC subcommittees work on issues related to data categories coordinated under the circular. Subcommittees establish and implement standards for data content, quality, and transfer; encourage the exchange of information and the transfer of data; and organize the collection of geographic data to reduce duplication of effort. Working groups are established for issues that transcend data categories.

For more information about the committee, or to be added to the committee's newsletter mailing list, please contact:

Federal Geographic Data Committee Secretariat  
c/o U.S. Geological Survey  
590 National Center  
Reston, Virginia 22092

Telephone: (703) 648-5514

Facsimile: (703) 648-5755

Internet (electronic mail): [gdc@usgs.gov](mailto:gdc@usgs.gov)

Anonymous FTP: <ftp://fgdc.er.usgs.gov/pub/gdc/>

World Wide Web: <http://fgdc.er.usgs.gov/fgdc.html>

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## 1. PARTS OF THE STANDARD

This Utilities Standard consists of a short main body and five appendices. The main body of the Utilities Standard defines the purpose of this standard, the process followed during its development, the organization(s) involved in its development and maintenance, and its relationship to other standards. Appendix A lists and defines the Feature Classes for this Utility Standard. Appendix B contains a comprehensive Feature Types report which lists the utilities feature type names and definitions, the object type, and their associated feature class and attribute table. Appendix C contains a comprehensive Attributes report which contains a complete listing of attributes associated with utilities feature types and each attribute's name and definition, data type, character length, and associated domain name. Appendix D contains a Domains report which contains a complete listing of domain names (and their definitions) and lists the potential values for each domain (and defines each value.)

A number of the domain lists are for proper names (e.g., reservoir names, utility company names, . . . ). The domains that list proper names are intended to be exemplary. The specific values (proper names) used by an organization or locality may vary geographically. Therefore, Appendix D is informative (not mandatory) and is not intended to standardize all domain values across the entire community of users of this standard. Whereas, Appendices A, B, and C are normative (i.e., mandatory parts of the standard.) The Utilities Standard also contains another informative appendix, Appendix E, that contains a series of entity relationship models for this Utilities Standard.

Appendix A	Utilities Feature Classes (normative)
Appendix B	Utilities Feature Types (normative)
Appendix C	Utilities Attributes (normative)
Appendix D	Utilities Domains (informative)
Appendix E	Utilities Entity Relationship Model (informative)

## 2. DEFINITIONS

For the purpose of this Utilities Standard, the following definitions apply.

1.1 **feature class** - a logical group of related feature types (e.g., grouping of water system components feature types such as water\_hydrant, water\_line, water\_pump, water\_reservoir, water\_tank, etc. into a water system feature class).

1.2 **feature type** - definition and description of a set (class of real world phenomena) into which similar feature instances are classified (e.g., water\_reservoir).

1.3 **feature instance** - real-world spatial phenomenon about which data is collected, maintained, and disseminated. (e.g., the McMillan Water Reservoir). Feature instances are the geospatial objects that are graphically delineated in a spatial database.

1.4 **attribute** - a defined characteristic of a feature type (e.g., an attribute of electrical cable feature type = electrical cable material).

1.5 **domain** - a finite list (or range) of permissible values for a specified attribute. Included are tables of: units of measure, types, styles, status, names, methods, materials, dispositions, sources, dimensions, data, classes, etc. (e.g., electrical cable material --Al, Fe, Pb, steel, Cu, . . . ).

1.6 **attribute value** - a specific quality or quantity assigned to an attribute for a specific feature instance (e.g., electrical cable material = Cu).

1.7 **IDEF modeling** - Integrated Definition (IDEF) is the name given to a family of over 30 graphical modeling techniques. The IDEF<sub>0</sub> and IDEF<sub>1x</sub> are the best known of these techniques. IDEF<sub>0</sub> techniques are used to describe business processes or activities for reengineering a function. IDEF<sub>1x</sub> techniques are used to define business rules and create a logical data model.

1.8 **geospatial data** - data with implicit or explicit reference to a location relative to the earth.

1.9 **data content standard** - provides the semantic definitions for a set of real world spatial phenomena of significance to a community. Data Content Standards may be organized and presented in a specified logical data model such as an entity-relationship model or and IDEFIX model

1.10 **utilities** - a manmade component of a system that provides a service to the public.

### 3. INTRODUCTION

#### 3.1 OBJECTIVE

The purpose of this Utilities Geospatial Data Content Standard (hereafter in this document abbreviated to Utilities Standard) is to standardize geospatial information for utility systems. This standard specifies the names, definitions and domains for utility system components that can be geospatially depicted as feature types and their non-graphical attributes. This Utilities Standard is classified as a **Data Content Standard** in the Federal Geographic Data Committee (FGDC) Standards Reference Model.

#### 3.2 SCOPE

This Utilities Standard supports large-scale, intracity applications such as engineering and life-cycle maintenance of utility systems. The utility system components addressed in this standard include: electrical monitoring and control, electrical distribution, fuel distribution, industrial waste collection, natural gas distribution, storm drainage collection, wastewater collection, water, and heating and cooling. The components of each utility system described in this Utility Standard are located outside the foundation of a structure. The scope of this standard currently does not include: communications, and alarm systems. At present this standard may not contain all the feature types necessary to model long distance utilities networks that stretch over long distances and between cities. This Standard uses a logical data model (described in section 3.) that is consistent with the Spatial Data Transfer Standard (SDTS).

#### 3.3 APPLICABILITY

This Utilities Standard is applicable for any system that captures or uses spatial data about utility systems (i.e., electrical monitoring and control, electrical distribution, fuel distribution, industrial waste collection, natural gas distribution, storm drainage collection, wastewater collection, water, and heating and cooling) in supports of life-cycle management applications i.e., planning, design, construction, and facilities management (FM). For example, this standard is applicable to support life-cycle management of a building complexes' natural gas distribution system or to support the management/maintenance of a private/public water distribution system.

#### 3.4 STANDARDS DEVELOPMENT PROCESS

This standard was developed by the Utilities project team under the guidance of the Facilities Working Group. Much of the utilities system information contained in this standard was extracted from the Tri-Services Spatial Data Standards (TSSDS). During the development process the project team examined the information and structure of the TSSDS and decided to use only the logical data model (feature, attribute, domain information) from the TSSDS. The project team decided that the physical data model contained in the TSSDS, which supports specific implementations (i.e., generates feature schemas for a number of common relational GIS/CADD systems), was inappropriate for a NSDI standard. Also, the initial feature, attribute, domain information from the TSSDS was revised by the Utilities project team. For example, common names were added to each of the attribute codes extracted from the TSSDS. Many of the revisions made for this Utilities Standard will also be incorporated into the next version of the TSSDS.

The Utilities project team had participants from Federal agencies, professional societies, and local governments, and private industry. Specifically the following organizations were significantly involved in the development of this standard:

U.S. Army Corps of Engineers  
American Public Works Association

Environmental Protection Agency  
Applied Geographics, Inc.

### 3.5 RELATED STANDARDS

As previously mentioned this Utilities Standard closely parallels the utilities information contained in the TSSDS.

### 3.6 MAINTENANCE

The Department of Defense, U.S. Army Corps of Engineers maintains the Utilities Standard for the Federal Geographic Data Committee with support from the Tri-Service CADD/GIS Technology Center. All general questions and comments concerning this standard should be addressed to:

**U. S. Army Corps of Engineers  
General Engineering Branch  
20 Massachusetts Avenue, NW  
Washington, DC 20314-1000**

All technical question and comments pertaining to this standard should be directed to:

**Tri-Service CADD/GIS Technology Center  
ATTN: CEWES-IM-DA  
3909 Halls Ferry Road  
Vickburg, MS 39180-6199**

#### 4. LOGICAL DATA MODEL

Agreement on a common format is not sufficient to ensure that the geospatial information transferred is meaningful to both the sender and the receiver. In order to share spatial data (and as part of a SDTS data transfer process) a common data model must be defined and used. In addition, semantic content of a spatial database (i.e., the entities and associated attribute and attribute value information) must be well defined and agreed upon by an application community and specified in either an off-line document (i.e. data content standard and/or in the metadata for a given database.) Part 2 of the SDTS is a formal attempt to develop a standardized list of entities. Additionally application communities that want to share geospatial information are developing data content standards modeled after the SDTS data model.

This Utilities Standard data model (figure 1.) is based upon the SDTS geospatial data model as presented in Parts 1 and 2 of that standard. The SDTS data model depicts the real world represented by features which are characterized by attributes that are assigned attribute values. This Utilities Standard defines utility system feature types and their attributes and specifies the domain (range or list) of attributes values. In addition, this standard incorporates several additional extensions to the SDTS data model including the concept of grouping utilities system components (feature types) into feature classes and linking specific attributes to specific feature types.

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## Utilities Data Model

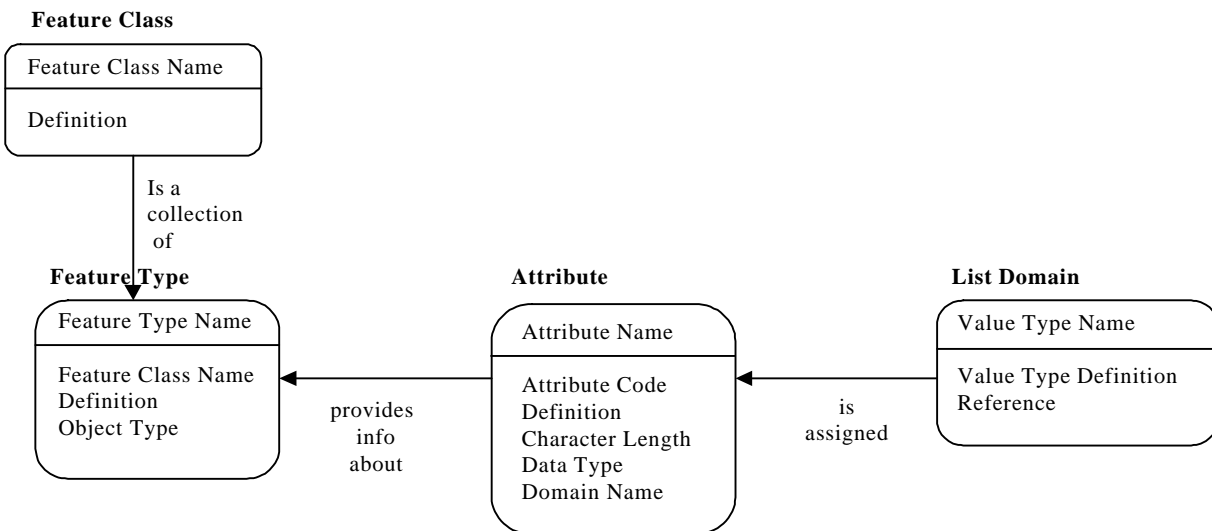


Figure 1.

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175 5. IMPLEMENTATION

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177 This Utility Standard has been implemented in hundreds of GIS and CADD/Facilities Management systems using the  
178 TSSDS for specific implementation guidance. Detailed information about implementing this Utilities Standard using  
179 the TSSDS physical data model is available for ESRI's ARC/INFO and Integraph's MGE GIS systems. This  
180 information is available as an example of how to implement this Utilities Standard and is not intended to mandate or  
181 recommend any vendors software.  
182

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184 6. REFERENCES

185  
186 Tri-Service CADD/GIS Technology Center (1997) "Tri-Service Spatial Data Standards," release 1.6.

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195 (Spatial Data Transfer Standard), U.S. Department of Commerce.  
196  
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